IRON BRIDGES,

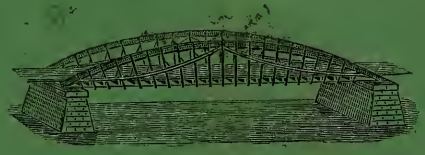
ROOFS, BUILDINGS, &c.

Manufactured by the

MOSELEY IRON BUILDING WORKS,

No. 53 Washington Street,

BOSTON.



PRINTED BY T. W. RIPLEY, 42 CONGRESS STREET.

1867.

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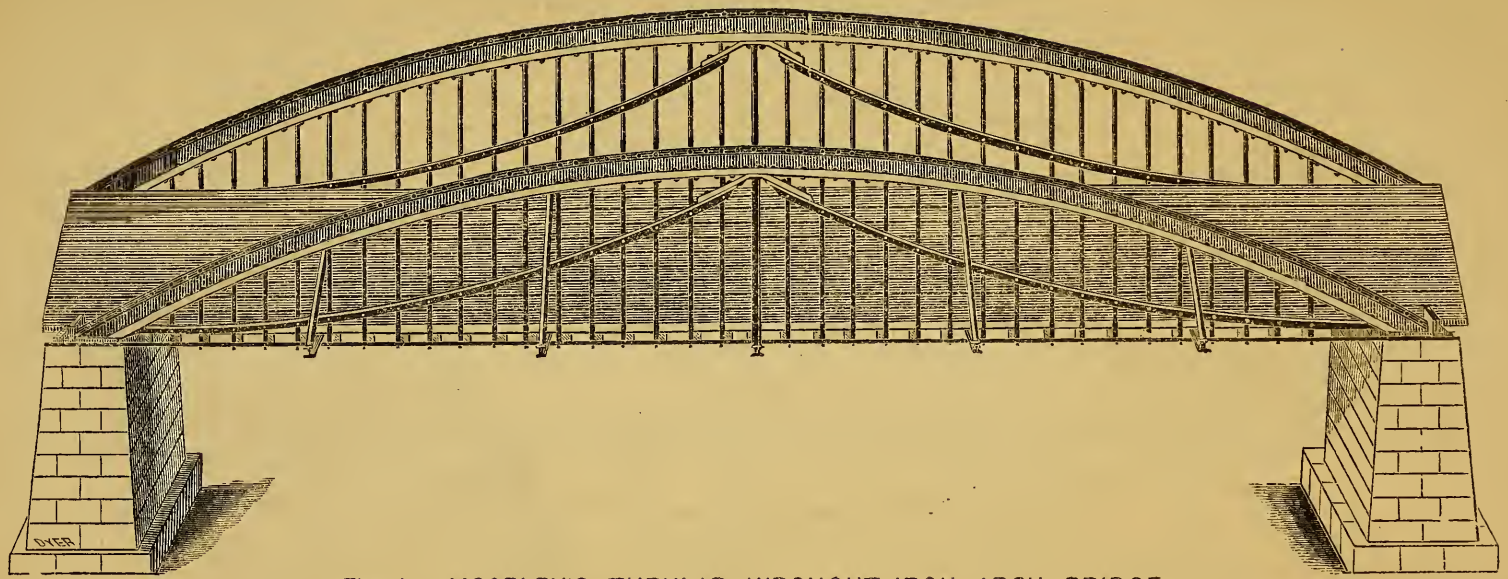


Fig. I. MOSELEY'S TUBULAR WROUGHT-IRON ARCH BRIDGE.

Perspective View of Highway Bridge.

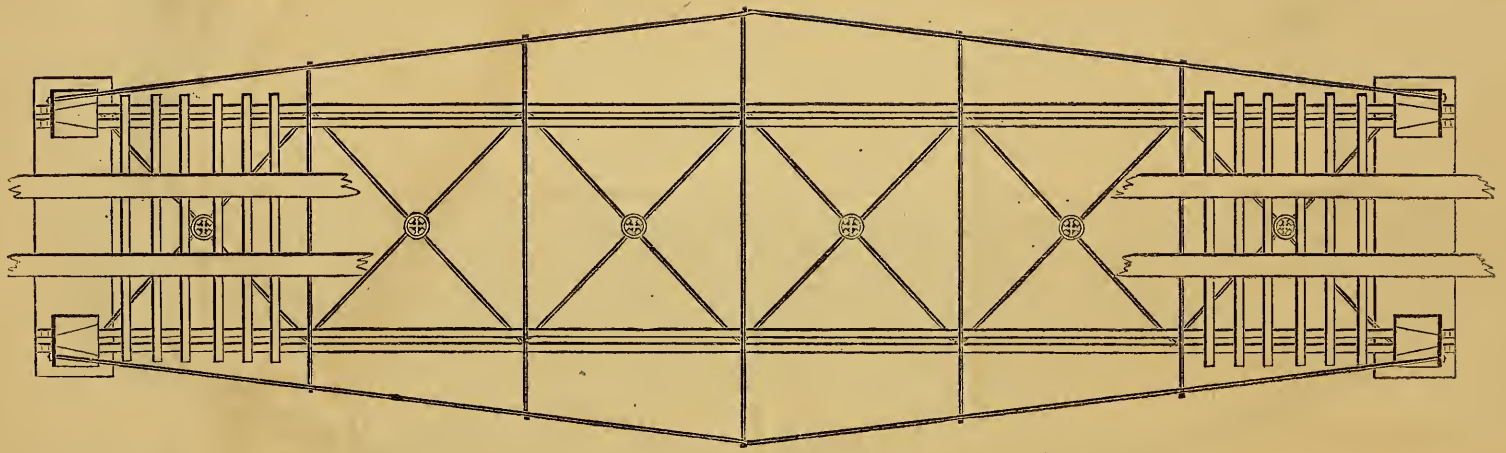


Fig. II. Ground Plan of Railroad Bridge.

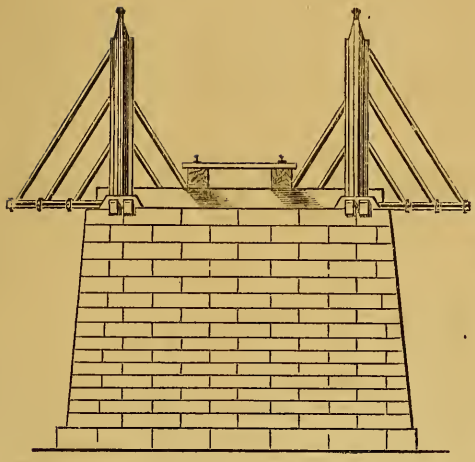


Fig. III. Section of Railroad Bridge.

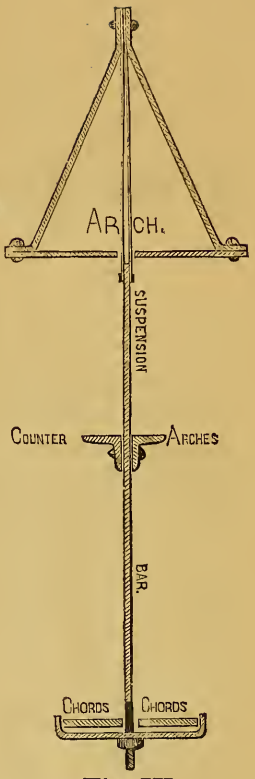


Fig. IV.
Section of Arch, Chords, &c.

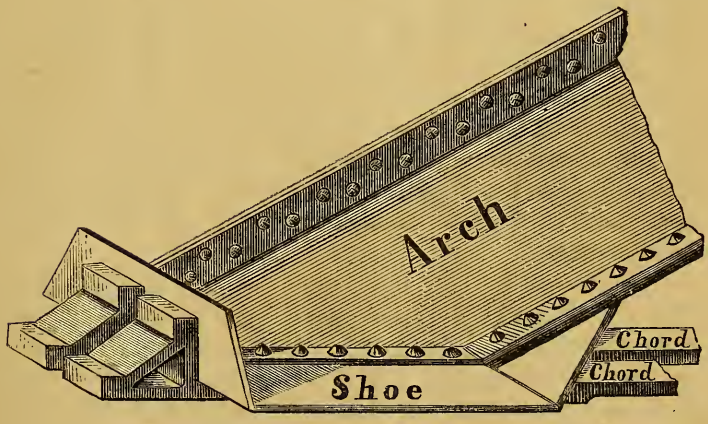


Fig. V. Part of Arch, with Shoe and Chords.

MOSELEY'S

Tubular Wrought-Iron Arch Bridge.

DESCRIPTION.

The supporting parts of the Bridge are two ARCHES, one on each side of the roadway. These Arches are hollow, and are triangular or three-sided; made of wrought plate or boiler iron, by riveting three plates together at their edges. [See Fig. IV. on the diagram, which shows the hollow Arch, with Suspension Bar passing through it.]

In no other form can iron be arranged to bear a greater burden than in this. By actual tests, every inch of iron in the cross section of the Arches will bear 15,000 lbs.; but in practice, we provide for a weight of not less than *four times* the required burden, calculated, moreover, at a pressure of **7,000** lbs. per square inch of section.

From foot to foot of each Arch goes the Chord [See Figs. I., II. and V.] This is double, and binds securely the feet of the Arch to each other, so that there is no *thrust* or outward pressure of the Arches to require heavy abutments. The only pressure upon the masonry is vertical. In Highway Bridges, the cross-section of the Chords has one-third the number of inches in that of the Arches; and in Railroad Bridges, one-half the number of inches in cross-section. The *tensile* strength of an inch of iron averages 60,000 lbs.: but, as will be seen, our calculations are based upon a tensile strain of **21,000** lbs. per square inch (in Railroad Bridges 14,000 lbs.), for four times the actual burthen.

The Chords are held level, or in line, by Suspension Bars. [See Figs. I. and IV.] These pass through the Arches; thence downward between the Counter-Arches (to which they are riveted), and support the Chord. They are placed at intervals of about 23 inches, giving 54 Bars in a fifty-feet Bridge. The same calculation governs the dimensions of these, as of the

other parts of the structure,—viz.: to provide for eight or ten times the actual burden.

The Counter-Arches are of Angle Bar, doubled; and, varying with the span, correspond to the dimensions of the Main Arches and Chords. [See Figs. I. and IV.]

The Floor rests upon the Chords,—a floor beam at every Suspension Bar. In common Highway Bridges of 16 to 20 feet wide, the floor beams may be of 3×14 inch lumber, covered with $2\frac{1}{2}$ or 3 inch plank.

The Braces *between* the Arches, shown in Fig. III., are for Railroad structures. In Highway Bridges they are not needed.

The adjustment of the various parts is such that no severe constant strain comes upon any bolt or other part of the structure; and thus all injury to the Bridge from jars, or impinging forces, is avoided. Hence there is no necessity for restriction as to rapidity of driving over it; and no injury has ever resulted from such cause. Contraction and expansion are fully provided for.

These Bridges were first introduced in 1855. They have been from time to time modified and improved in the details of construction, until they now challenge comparison with all others.

The earlier Bridges lacked the COUNTER ARCHES which, as now constructed, correct all undue elasticity.

Later still, the present Suspension Bars, which enter the Arch, and are riveted into its Comb, were adopted, in lieu of the former Rods, which were connected with the Arch by means of a stirrup passing over it; and which failed to give the compact union of the parts now secured.

While, for *all* purposes of a Bridge, the Tubular-Arch principle is unsurpassed, we claim that, for certain uses, it cannot be *approached* in economy and security by any other.

1st. For Railway or Highway Bridges of LONG SPANS.

The Tubular Arch can be carried to lengths equal to those of the Wire Suspension Bridges. It surpasses these in rigidity and permanence, as well as in the important item of cost of Piers and Abutments. No heavy Cables, Anchors and Towers are required. It also, in these cases, greatly excels any form of

Truss yet invented, both in economy of material and in rapidity of construction; while never liable, like the latter, to sudden breakage from the yielding of a single part.

2d. For light Foot-Bridges, either at the ground, or connecting buildings at their upper stories. This style gives a light and slender structure, amply strong, while in itself an architectural embellishment.

The Diagrams of course present the simplest form of construction; but the TUBULAR ARCH BRIDGE is capable of any degree of graceful modification for ornamental purposes.

Among the large number of Bridges built upon this plan, we refer to the following. They vary in length from forty to above two hundred feet:—

Manchester,* N. H.	3 Bridges.
Boston,* Mass.	2 Bridges.
Lawrence,* Mass.	2 Bridges.
Medway,* "	
Southbridge,* "	
Lowell,* " [Appleton Co.]	3 Bridges.
Blackstone,* "	Railroad Bridge.
Woonsocket,* R. I., [Harris Mill.]	
Norwich,* Conn.	
Cincinnati, Ohio	
Butler County, "	3 Bridges.
Highland " "	
Napoleon, "	
Perrysburg, "	
Akron, " [Aqueduct]	
Milford, "	
Berea, "	2 Bridges.
Warren "	
Belleville, "	
Mansfield, "	
Ripley,* "	2 Bridges.
Toledo,* "	
Ironton,* "	Railroad Bridge.
Allen County, Indiana,	
Chicago, Illinois	Pivot Draw-Bridge.
Galena, "	Pivot Draw-Bridge.
Golconda, "	
Clay City,* "	2 Bridges.
Newport, Kentucky,	3 Bridges.
Covington, "	
Berry's Station, "	2 Bridges.
Bryant's " "	
Lexington, "	

*Built with COUNTER ARCHES.

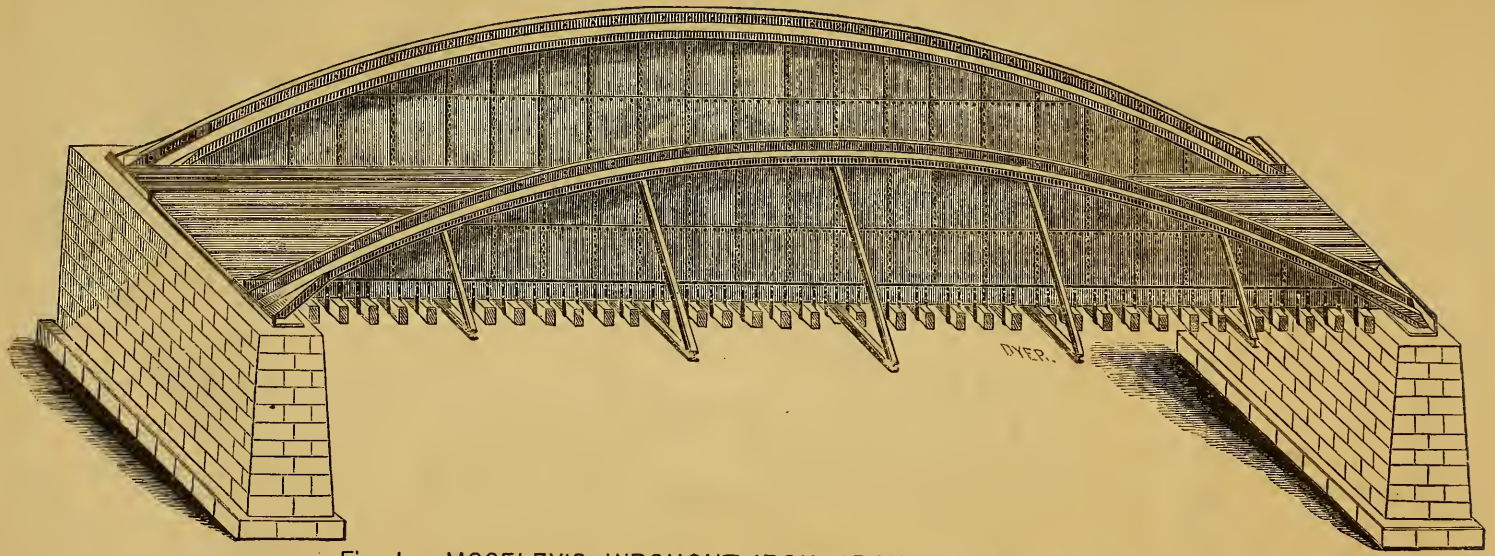


Fig. I. MOSELEY'S WROUGHT-IRON ARCH GIRDER BRIDGE.

PERSPECTIVE VIEW OF BRIDGE.

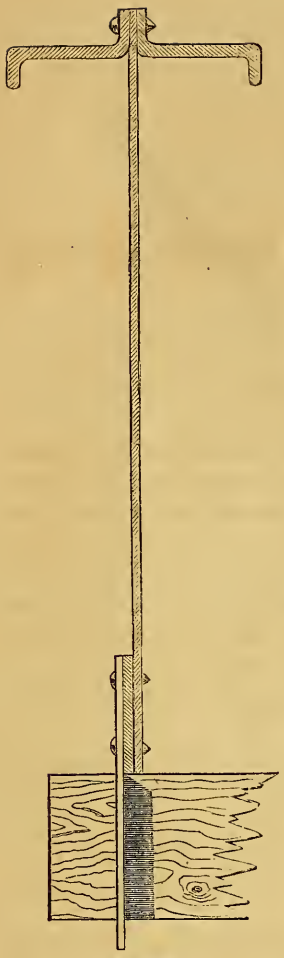


Fig. II.
Section of Girder, with Chord-Plate, Stirrup and Floor-Beam.

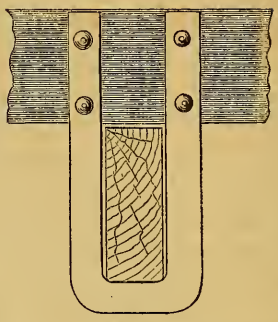


Fig. IV.
Part of Chord-Plate and Stirrup, with Sect. of Floor-Beam.

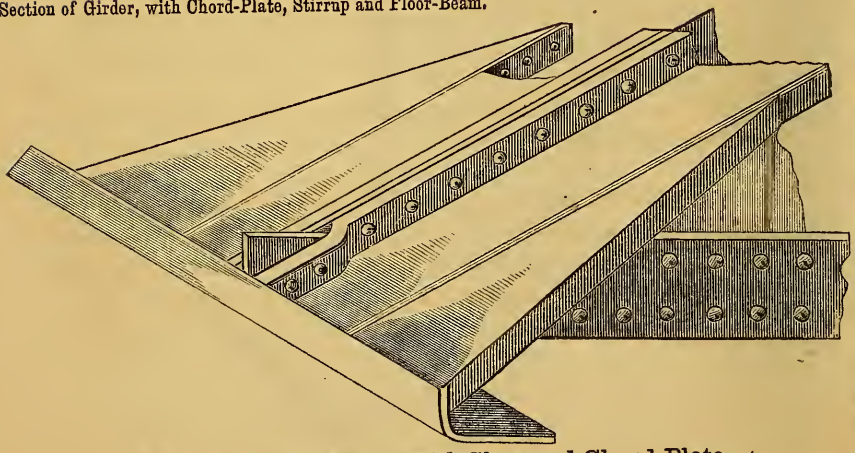


Fig. III. Part of Arch with Shoe and Chord-Plate.

MOSELEY'S

Wrought-Iron Arch Girder Bridge.

DESCRIPTION.

This Bridge is wholly of Wrought Iron. The upper member of each Girder consists of two heavy Flanged Plates, arched as shown in the figure, and riveted solidly upon either side of the Body Plate **A**., along its Arc. [See Figs. I. and II.]

Along the base of the Body Plate passes the Chord Plate, firmly riveted to it; from which depend the Stirrups, which support the Floor Beams. [See Figs. II. and III.]

For Ground-Plan of Railroad Bridge, see Fig. II. of Tubular Arch Bridge.

The Floor Beams are placed about 23 inches apart; and for ordinary Highway Bridges of 16 to 20 feet width may be of lumber 3 × 14 inch, covered with 2½ or 3 inch plank flooring.

The whole is rigid, and of exceeding strength. Every pound of iron used in the structure will sustain one hundred pounds of burden.

An Experimental Bridge of 15 feet length, at our Factory, sustained a burden of 22,000 pounds.

An ordinary Highway Bridge, recently built by us for the Boston, Lowell and Nashua Railroad, of 38 feet span, sustained, under test, a 30-ton locomotive.

Railroad Bridges are built of four times this strength, costing less than three times the price.

This plan of Bridge was patented in October, 1866. It is offered, not as superior to the Tubular Arch Bridge before described, nor as intended to supersede it. One is equally strong and reliable with the other. It is the result of long experiments to devise a structure, which, for moderate spans,

should combine the utmost economy with strength; and, at the same time, satisfy those who prefer a firm and less elastic Bridge than the other. In rigidity it approaches a stone bridge; while, even in New England, its cost is not far from that of wood. For railway and common travel it is altogether the most economical mode of construction yet invented. It is not, however, recommended for spans of more than 100 feet, since for longer spans, the weight of material and cost of erection increase more rapidly than in the Tubular Arch.

Various bridges of this style have already been built in this vicinity, of spans varying from 20 to 90 feet; three in number for the Boston & Lowell Railroad Company, whose test of the first built for them is above noted.

For Pivot Draw-Bridges either style of construction offers great facilities. In connection with our Turn-Table and Tower, they revolve with wonderful ease and rapidity.

Orders for either style of Bridge promptly executed. Full information readily given on application. Models of all our styles of work to be seen at our office.

Iron Roofs, Buildings, &c.

IRON ROOFS, BUILDINGS, &c.

THE rapidly increasing demand for fire-proof structures has induced us to give special attention to this branch of our business; and we are prepared to challenge competition in the economy, simplicity, and durability of our styles of iron building. Using wrought-iron exclusively, we avoid the hazard of *castings*, and ensure reliable work.

The experience of years has added constantly to our facilities for securing choice materials and skilled workmanship. The wide adoption of our structures by Railroad Companies and Manufacturers, whose buildings are exposed to extra hazard from fire, proves conclusively their value; and our best encouragement is found in the fact that of our many customers — some of whose names are appended — about two-thirds have doubled, trebled, and in some instances increased seven-fold their original orders.

The recent numerous and severe disasters from fire have called the attention of property-holders, as well as insurers, to the absolute necessity of more efficient safeguards; and in numerous instances we have been gratified by the testimony of our customers and of Insurance Companies, to the protection from heavy losses which our work has afforded.

Having a Rolling Mill in connection with our manufactory, specially adapted to our uses, we are able to execute orders with great promptness.

We are also prepared to roll, to order, the various kinds of PLATE, SHEET, and SHAPE iron required by manufacturers.

The following Diagrams, with their explanations, will show that we manufacture and erect all varieties of Iron roofs and buildings. We can cover wooden frame-buildings with our corrugated sheets, affording substantial protection from fire; or we can construct entirely of iron, and thus ensure absolute safety.

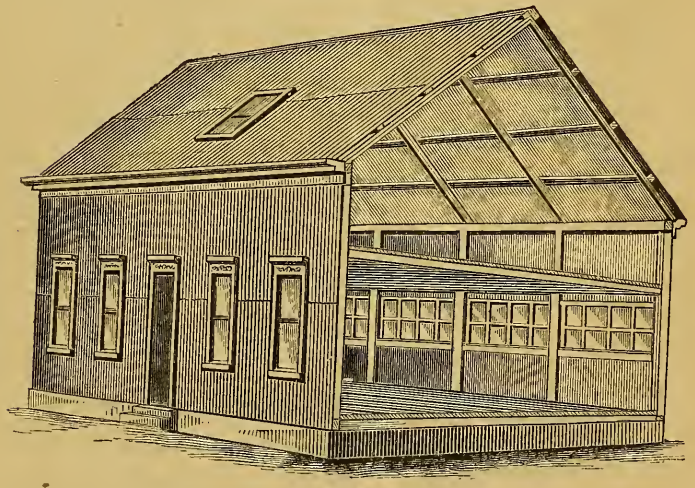
We furnish, also, of wrought-iron, as required,—

FLOORS, BALCONIES, FENCES,
PARTITIONS, FIRE-ESCAPES, GATES,
GIRDERS, LADDERS, PORCHES,

and, generally, whatever wrought-iron work pertains to building.

No. 1.

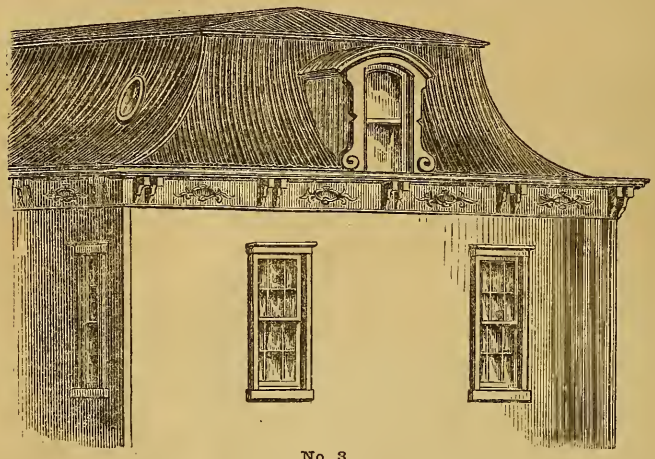
This cut represents the iron sheets, corrugated. The sheets are from $4\frac{1}{2}$ to $8\frac{1}{2}$ feet long, and about 2 feet wide, — in thickness similar to stove-pipe iron, weighing 1 lb. to the square foot in the sheet; including laps of sheets, $1\frac{1}{6}$ lb. Such iron we ship in bundles with perfect convenience, — well painted with red oxide of iron and oil.



No. 2.

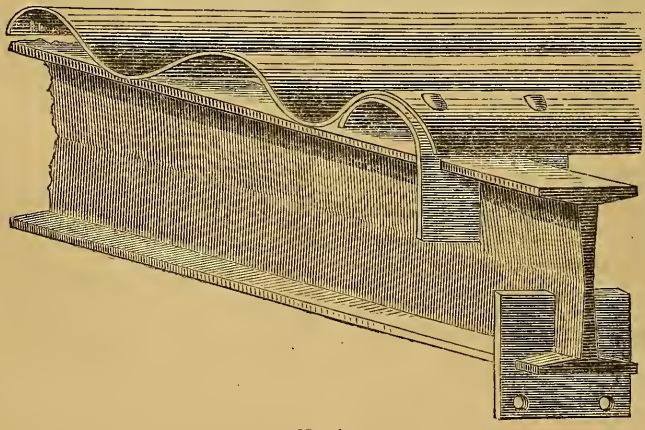
Here is represented a common building, partly covered with the sheets; with common rafters, about 10 feet apart. On the rafters lies scantling 3×4, as ribs or purlins. These ribs are about 2 feet apart, and the corrugated sheets lie with a rib under each end, and one or two under the middle, and are fastened by our barbed nails to the ribs. The edges lap over

at the sides, about two inches, and the ends lap like shingles over the lower sheets about three inches; making a neat joint. The Roof thus made has less than one-fourth the lumber in an ordinary roof, and is sufficiently strong and stiff to bear the snow; yet with so little timber as to be almost fire-proof. Old roofs already boarded can be used without change. This cut also represents the mode of applying the corrugated sheets to sides of buildings.



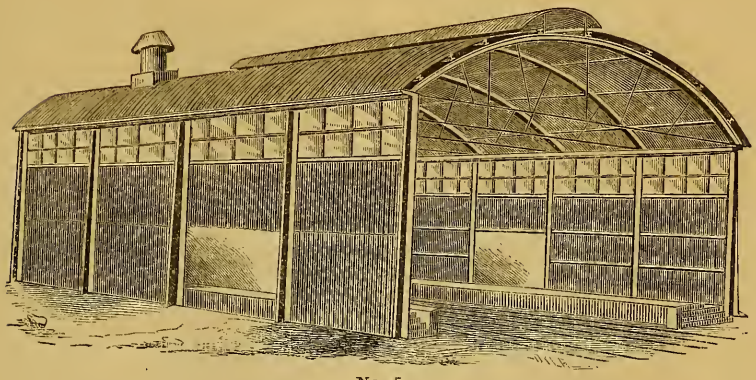
No. 3.

This cut represents a building with a French roof, covered with our curved corrugated iron sheets. There is no joint across the sheet between the eaves and the trough. We require the curve of the French roof to be an arc of a true circle. The Mansard roof is very beautiful when covered in this manner.



No. 4.

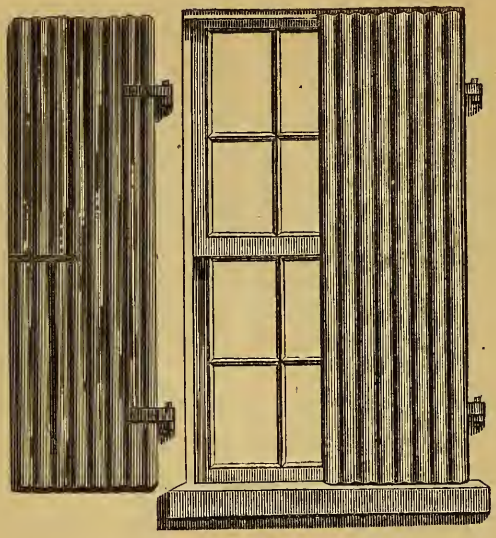
Figure 4 represents long bars of iron used as ribs; and, as may be seen, the end, or cross section, represents the letter **I**, and we term it **I** iron. It is $2\frac{1}{4}$ inches wide; flanges $1\frac{1}{8}$ inches wide. We use these as ribs, when parties desire them, instead of the wooden ribs as in No. 2. Here is also shown the method of attaching the sheets to the **I** ribs, and the ribs to the arches and rafters.



No. 5.

The above cut represents an Iron Building. The whole is built of wrought-iron. The roof is equally adapted to walls of iron, brick, stone, or wood. Here, the roof is supported by wrought-iron columns of any desired height, flanged to admit the siding, and deeply set in stone and cement, at distances of 15 feet apart. They are connected at top by a heavy bar of Angle-iron, which, making the entire circuit of the building, serves as a wall-plate, and gives unity to the structure. The arches of the roof rest upon these, and no foundation is required except at the base of the columns. Thus, where piling is necessary, 20 piles will support a building 100 × 40 feet. Light ribs of iron or wood pass from column to column, to which our corrugated sheets are fastened for sides and ends. Both "Monitor" and Cylindrical Ventilators are represented, either of which can be supplied. The plan enables the building to be closed or thrown open with great facility, and sliding doors may be inserted wherever required. For Railroad Depots, Rolling Mills, Foundries, Manufactories, Gas Houses, Boiler and Engine Houses, and like uses, these buildings and roofs are unsurpassed. They can be built of any required width; those

erected by us varying in clear span from 10 to 156 feet. We call the special attention of Railroad managers to a Locomotive-House Roof of the latter diameter, built by us in Boston for the O. C. & N. R. Co. We are constantly sending these roofs and buildings to all parts of New England and other States. They can be packed for transportation to any distance, and erected by any skilled mechanics.



No. 6.

This cut represents Shutters and Doors of wrought iron. They are of less than one-third the weight of ordinary iron shutters, costing only about one-half as much, and are very ornamental.

We invite examination of the Iron Roofs and other structures built by us for the following parties, among others, to whom we respectfully refer: —

RAILROADS.

Boston & Worcester Railroad Co.	Boston, Mass.
Eastern Railroad Co.	" "
Old Colony & Newport Railway Co.	" "
" " "	Fall River, Mass.
Metropolitan Railroad Co.	Boston, Mass.
Boston & Providence Railroad Co.	Roxbury, Mass.
Boston & Lowell "	Somerville, "
" " "	Medford, "
" " "	Wilmington, "
Taunton Railroad Co.	Taunton, "
Boston, Hartford & Erie Railroad Co.	Blackstone, "
Nashua & Lowell Railroad Co.	Nashua, "
Providence, Hartford & Fishkill Railroad Co.	Hartford, Conn.
Houston & Texas Central Railroad Co.	Houston, Texas.
Iron Railroad Co.	Ironton, Ohio.
Union Pacific Railroad Co.	Atchison, Kansas.
Northern Railway Co.	Toronto, Canada West.

IRON AND STEEL WORKS.

Naylor & Co.	Boston, Mass.
Bay-State Iron Co.	" "
Whipple File Manufacturing Co.	" "
Boston Steel and Iron Co.	" "
Pratt & Wentworth	" "
Lazell, Perkins & Co.	Bridgewater, Mass.
Bates, Hyde & Co.	" "
I. Washburn & Moen Wire Works	Worcester, "
Quinsigamond Iron and Wire Works	" "
Tremont Nail Co.	Wareham, "
Whiting & Clapp	Roxbury, "
Forge Village Horse Nail Co.	Forge Village, "
Lyman Kinsley & Co.	Cambridgeport, "
Mt. Hope Iron Co.	Somerset, "

American File Co.	Pawtucket, R. I.
Woodruff & Beach Iron Works	Hartford, Conn.
Albertson & Douglass Machine Co.	New London, Conn.
Benedict & Burnham Manufacturing Co.	Waterbury, "
American Flask and Cap Co.	" "
Eagle Lock Co.	Terryville, "
Sargent & Co.	New Haven, "
Birmingham Iron Foundry Co.	Birmingham, "
S. Stow Manufacturing Co.	Plantsville, "
Montauk Iron and Steel Co.	New York City.
J. R. Thompson & Co.	Jersey City, N. J.

COTTON AND WOOLEN MANUFACTORIES.

Hyde Park Woolen Co.	Hyde Park, Mass.
Appleton Manufacturing Co.	Lowell, Mass.
Lowell Bleachery	" "
Pacific Mills	Lawrence, "
Washington Mills	" "
Naumkeag Steam Cotton Co.	Salem, "
Roxbury Steam Mills,	Roxbury, "
Merchants' Woolen Co.	Dedham, "
Dolby Mills	Newton, "
Beaman Manufacturing Co.	West Boylston, Mass.
Chicopee Manufacturing Co.	Chicopee, "
Boston Manufacturing Co.	Waltham, "
Edward Eaton, Esq.	Medway, "
American Linen Co.	Fall River, "
Amoskeag Manufacturing Co.	Manchester, "
Stark Mills	Manchester, N. H.
Ashuelot Woolen Co.	Ashuelot, "
Eagle Flannel Mills	Newport, "
Androscoggin Mills	Lewiston, Me.
Atlantic DeLaine Co.	Providence, R. I.
Riverside Mills	" "
A. & W. Sprague Manufacturing Co.	" "
Cranston Print Works	Cranston, "
W. F. & F. C. Sayles	Pawtucket, "
United States Flax Co.	Central Falls, "
Albion Co.	Valley Falls, "
Edward Harris, Esq.	Woonsocket, "

Florence Mills	Rockville, Conn.
Leeds Mills	" "
Rock Manufacturing Co.	" "
Union Manufacturing Co.	Manchester, "
Willimantic Linen Co.	Willimantic, "
Norwich Bleaching and Calendering Co.	Norwich, "
W. G. Medlicott, Esq.	Windsor Locks,
Victory Mills	Saratoga, N. Y.
Harmony Mills	Cohoes, "
Ogden Mills	" "

RUBBER MANUFACTORIES.

Boston Belting Co.	Boston, Mass.
Boston Rubber Shoe Co.	" "
National Rubber Co.	Providence, R. I.
Goodyear Metallic Rubber Shoe Co.	Naugatuck, Conn.
New York Belting and Packing Co.	New York City.

GLASS WORKS.

New England Glass Co.	Boston, Mass.
Lenox Plate Glass Co.	Lenox, "
New Bedford Glass Co.	New Bedford, Mass.

SHOE AND LEATHER MANUFACTORIES.

Adams, Lowe & Newton	Boston, Mass.
Thos. E. Proctor	" "
B. & A. Foley	Roxbury, "
Breed, Doake, Keene & Davis	Lynn, "
Jacob Putnam & Co.	Salem, "
Abel E. Bridge & Co.	Lowell, "
A. C. Mayhew, Esq.	Milford, "

PAINT AND OIL MANUFACTORIES.

Boston Lead Co.	Boston, Mass.
Banker & Carpenter	" "
Wm. J. Parsons & Co.	" "
Loring, Bangs & Co.	" "
Wm. F. Freeman & Co.	" "
Hodges & Silsbee	" "
F. H. Jenney, Esq.	" "

SAWING AND PLANING MILLS.

Bay-State Moulding Mills	Boston, Mass.
Harlows' Mills	Middleboro', Mass.
J. C. Hathaway, Esq.	Ottawa, Ill.

GAS COMPANIES.

Dedham Gas-Light Co.	Dedham, Mass.
Waltham " "	Waltham, "
Charlestown " "	Charlestown, Mass.
Watertown " "	Watertown, "
Roxbury " "	Roxbury, "
Galesburg " "	Galesburg, Ill.

MINING COMPANIES.

Albany and Boston Mining Co. (Office in Boston)	Michigan
Portage Lake Smelting Co. " "	"
Huron Mining Co. " "	"
Rhode Island Mine	"
La Salle Coal Co.	La Salle Ill.

MISCELLANEOUS.

United States Navy Yard	Charlestown, Mass
U. S. Naval Hospital	Chelsea, "
Boston Wharf Co.	Boston, "
Bigelow, Hayden & Co.	" "
J. E. & N. Brown	" "
G. J. F. Bryant, Esq.	" "
John H. Sturgis, Esq.	" "
Josiah Quincy, Esq.	" "
N. C. Munson, Esq.	" "
Chas. Hulbert, Esq.	" "
Francis Standish, Esq.	" "
A. S. & W. G. Lewis	" "
Rockland Bank	Roxbury, "
Byam, Carlton & Co.	Boxford, "
J. Estey & Co.	Brattleboro', Vt.
Seth Thomas Clock Co.	Thomaston, Conn.
Ford & Kimball	Concord, N. H.